

# CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: July 22, 2020

TO: Lisa Lumley – NER

FROM: Wade Strickland – WY/3 *Diane Sigil for WY*

SUBJECT: Water Quality-Based Effluent Limitations for the Tigerton Wastewater Treatment Facility  
WPDES Permit No. WI-0022349-09

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using Chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Tigerton Wastewater Treatment Facility (WWTF) in Shawano County. This municipal WWTF discharges to the South Branch Embarrass River, located in the South Branch Embarrass River – Embarrass River Watershed in the Upper Fox and Wolf River Basin. This discharge is included in the Upper Fox and Wolf River Basin TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD <sub>5</sub>			45 mg/L	30 mg/L		1
TSS			45 mg/L 42.7 lbs/day	30 mg/L 28.6 lbs/day		3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen						4,5
April & May	Variable		<b>108 mg/L</b>	<b>108 mg/L</b>		
June – September	Variable		<b>108 mg/L</b>	<b>108 mg/L</b>		
October – March	Variable		<b>108 mg/L</b>	<b>98 mg/L</b>		
Bacteria						6
Interim Limit				400 #/100 mL		
Fecal Coliform				geometric mean		
Final Limit				126 #/100 mL		
<i>E. coli</i>				geometric mean		
Phosphorus						3,7
Interim				5.7 mg/L		
TMDL				0.620 lbs/day	0.207 lbs/day	
Nitrite + Nitrate						2,8
Nitrogen, Total						2,8
Kjeldahl						
Total Nitrogen						2,8

Footnotes:

1. No changes from the current permit
2. Monitoring only
3. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the Upper Fox and Wolf River Basin to address phosphorus water quality impairments within the TMDL area. The TMDL was approved by EPA February 2020.

4. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	108	$7.0 < \text{pH} \leq 7.1$	66	$8.0 < \text{pH} \leq 8.1$	14
$6.1 < \text{pH} \leq 6.2$	106	$7.1 < \text{pH} \leq 7.2$	59	$8.1 < \text{pH} \leq 8.2$	11
$6.2 < \text{pH} \leq 6.3$	104	$7.2 < \text{pH} \leq 7.3$	52	$8.2 < \text{pH} \leq 8.3$	9.4
$6.3 < \text{pH} \leq 6.4$	101	$7.3 < \text{pH} \leq 7.4$	46	$8.3 < \text{pH} \leq 8.4$	7.8
$6.4 < \text{pH} \leq 6.5$	98	$7.4 < \text{pH} \leq 7.5$	40	$8.4 < \text{pH} \leq 8.5$	6.4
$6.5 < \text{pH} \leq 6.6$	94	$7.5 < \text{pH} \leq 7.6$	34	$8.5 < \text{pH} \leq 8.6$	5.3
$6.6 < \text{pH} \leq 6.7$	89	$7.6 < \text{pH} \leq 7.7$	29	$8.6 < \text{pH} \leq 8.7$	4.4
$6.7 < \text{pH} \leq 6.8$	84	$7.7 < \text{pH} \leq 7.8$	24	$8.7 < \text{pH} \leq 8.8$	3.7
$6.8 < \text{pH} \leq 6.9$	78	$7.8 < \text{pH} \leq 7.9$	20	$8.8 < \text{pH} \leq 8.9$	3.1
$6.9 < \text{pH} \leq 7.0$	72	$7.9 < \text{pH} \leq 8.0$	17	$8.9 < \text{pH} \leq 9.0$	2.6


5. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
6. Limits apply during the disinfection season of May through September. The fecal coliform interim limit will apply until the end of the compliance schedule when *E. coli* limits take effect. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. The monthly average phosphorus concentration limit of 5.7 mg/L functions as an interim limit for the phosphorus compliance schedule.
8. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen (total kjeldahl nitrogen and nitrate/nitrite) monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate ( $\text{NO}_3$ ), nitrite ( $\text{NO}_2$ ), and total kjeldahl nitrogen (all expressed as N).

Following the October 29, 2019 Department's WET Program Guidance Document, no WET testing is required.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nicole Krueger at [Nicole.Krueger@wisconsin.gov](mailto:Nicole.Krueger@wisconsin.gov) or Diane Figiel at [Diane.Figiel@wisconsin.gov](mailto:Diane.Figiel@wisconsin.gov).

Attachments (2) – Narrative & Outfall Map

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Attachment #1  
**Water Quality-Based Effluent Limitations for the  
Tigerton Wastewater Treatment Facility**

**WPDES Permit No. WI-0022349-09**

Prepared by: Nicole Krueger

**PART 1 – BACKGROUND INFORMATION**

**Facility Description:**

Treatment consists of a collection system including five lift stations, primary sedimentation, aeration basins, final clarification and ultraviolet disinfection. Sludge is stabilized using an anaerobic digester. Sludge is land applied to agricultural fields.

Attachment #2 is a map of the area showing the approximate location of Outfall 001.

**Existing Permit Limitations:** The current permit, expiring on 06/30/2020, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
BOD <sub>5</sub>			45 mg/L	30 mg/L		1
TSS			45 mg/L	30 mg/L		
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen	Variable					2
Fecal Coliform May – September				400#/100 mL geometric mean		
Phosphorus						3
Acute WET						4

Footnotes:

- These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
- The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values are included in the permit in place of a single limit.

Effluent pH - s.u.	NH <sub>3</sub> -N Limit – mg/L	Effluent pH - s.u.	NH <sub>3</sub> -N Limit – mg/L
pH ≤ 7.7	No Limit	8.3 < pH ≤ 8.4	7.8
7.7 < pH ≤ 7.8	24	8.4 < pH ≤ 8.5	6.4
7.8 < pH ≤ 7.9	20	8.5 < pH ≤ 8.6	5.3
7.9 < pH ≤ 8.0	17	8.6 < pH ≤ 8.7	4.4
8.0 < pH ≤ 8.1	14	8.7 < pH ≤ 8.8	3.7
8.1 < pH ≤ 8.2	11	8.8 < pH ≤ 8.9	3.1
8.2 < pH ≤ 8.3	9.4	8.9 < pH ≤ 9.0	2.6

- Monitoring only.
- Acute WET tests were done once every other year with dilution series 100, 50, 25, 12.5, and 6.25%.

**Receiving Water Information:**

- Name: South Branch Embarrass River
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm water sport fish community, non-public water supply.
- Low Flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q<sub>10</sub> and 7-Q<sub>2</sub> values are from USGS for Station W24, where Outfall 001 is located.
  - 7-Q<sub>10</sub> = 15 cfs (cubic feet per second)
  - 7-Q<sub>2</sub> = 24 cfs
  - 90-Q<sub>10</sub> = 20 cfs
  - Harmonic Mean Flow = cfs using a drainage area of 90.5 mi<sup>2</sup>The Harmonic Mean has been estimated based on average flow and the 7-Q<sub>10</sub> using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 229 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from 09/11/1997 to 10/08/1997 from the South Branch of the Embarrass River, approximately ten miles downstream of Tigerton's outfall.
- % of low flow used to calculate limits in accordance with s. NR 106.06 (4) (c) 5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the South Branch, Middle Branch and mainstem of the Embarrass River approximately ten miles downstream of Tigerton is used for this evaluation. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None
- Impaired water status: The immediate receiving water is not impaired. Poygan Lake, over 50 miles downstream is listed as impaired for PCBs, total phosphorus, and total suspended solids.

**Effluent Information:**

- Design Flow Rate(s):
  - Annual average = 0.112 MGD (Million Gallons per Day)For reference, the actual average flow from 07/01/2015 to 02/29/2020 was 0.08 MGD. This flow was monitored at the influent location, because there is no flow meter to measure the effluent flow.
- Hardness = 217 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of data from 11/19/2019 to 11/28/2019.
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: Domestic wastewater with water supply from wells
- Additives: None
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus Ammonia, Chloride, Hardness and Phosphorus.

Attachment #1

	Chloride mg/L
11/19/2019	160
11/22/2019	160
11/25/2019	150
11/28/2019	130
Average	150

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
11/19/2019	10	12/01/2019	10	12/13/2019	17
11/22/2019	16	12/04/2019	7.5	12/16/2019	12
11/25/2019	17	12/07/2019	8.5	12/19/2019	10
11/28/2019	12	12/10/2019	16		
1-day P <sub>99</sub> = 23 µg/L					
4-day P <sub>99</sub> = 17 µg/L					

Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”.

The following table presents the average concentrations and loadings at Outfall 001 from 07/01/2015 to 02/29/2020 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

	Average Measurement
BOD <sub>5</sub>	9.00 mg/L*
TSS	3.12 mg/L*
pH field	7.11 s.u.
Ammonia Nitrogen	10.1 mg/L
Fecal Coliform	51.6 #/100mL*

\*Results below the level of detection (LOD) were included as zeroes in calculation of average.

## **PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN**

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99<sup>th</sup> percentile (or P<sub>99</sub>) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

**Acute Limits based on 1-Q<sub>10</sub>**

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q<sub>10</sub> receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards.

$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

WQC = Acute toxicity criterion or secondary acute value according to ch. NR 105

Q<sub>s</sub> = average minimum 1-day flow which occurs once in 10 years (1-day Q<sub>10</sub>)

if the 1-day Q<sub>10</sub> flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q<sub>10</sub>).

Q<sub>e</sub> = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

C<sub>s</sub> = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Tigerton WWTF and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated water quality-based effluent limitations for this discharge along with the results of effluent sampling for all the detected substances. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

RECEIVING WATER FLOW = 12.0 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>
Arsenic		340	680	136	<2.2	
Cadmium	217	25.1	50.2	10.0	<0.19	
Chromium	217	3406	6813	1363	<0.83	
Copper	217	32.3	64.6			23
Lead	217	226	453	90.6	<4.3	
Nickel	217	905	1810	362	<1.1	
Zinc	217	237	475	95.0	23	
Chloride (mg/L)		757	1510	303	150	

\* \* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q<sub>10</sub> flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**RECEIVING WATER FLOW = 3.75 cfs (¼ of the 7-Q<sub>10</sub>), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK- GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Arsenic		152.2		3446	689.1	<2.2	
Cadmium	175	3.82		86.5	17.3	<0.19	
Chromium	229	259.93		5885	1176.9	<0.83	
Copper	229	20.99		475.2			17
Lead	229	62.23	0.66	1395	278.9	<4.3	
Nickel	229	105.01		2377	475.5	<1.1	
Zinc	229	247.96	6.71	5468	1093.7	23	
Chloride (mg/L)		395	9.75	8730	1750	150	

\* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

**Monthly Average Limits based on Wildlife Criteria (WC)**

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

**Monthly Average Limits based on Human Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 9.2478 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370		20115	4023	<0.19
Chromium (+3)	3818000		307600000	41510000	<0.83
Lead	140	0.66	7580	1520	<4.3
Nickel	43000		2300000	470000	<1.1

**Monthly Average Limits based on Human Cancer Criteria (HCC)**

RECEIVING WATER FLOW = 9.2478 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	723	145	<2.2

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

**Conclusions and Recommendations:** Based on a comparison of the effluent data and calculated effluent limitations, no effluent limitations are required for any toxic substances in this section.

Mercury – The permit application did not require monitoring for mercury because the Tigerton is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3., Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, “there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5).” A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from 05/04/2015 to 10/03/2019 was 0.624 mg/kg, with a maximum reported concentration of 1.3 mg/kg. Therefore, no mercury monitoring is recommended at Outfall 001.

### **PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN**

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has variable daily maximum limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- The maximum expected effluent pH has changed

#### **Daily Maximum Limits based on Acute Toxicity Criteria (ATC):**

Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation.

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - \text{pH})})] + [B \div (1 + 10^{(\text{pH} - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a Warm Water Sport fishery, and  
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1217 sample results were reported from 07/02/2015 to 02/28/2020. The maximum reported value was 7.80 s.u. (Standard pH Units). The effluent pH was 7.60 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.56 s.u. and the mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.55 s.u. Therefore, a value of 7.60 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.60 s.u. into the equation above yields an ATC = 17 mg/L.

**Potential changes to daily maximum Ammonia Nitrogen effluent limitations:**

Subchapter IV of ch. NR 106, Wis. Adm. Code (effective September 1, 2016) specifies methods for the use of the 1-Q<sub>10</sub> receiving water low flow to calculate daily maximum ammonia nitrogen limits if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

	Ammonia Nitrogen Limit mg/L
2×ATC	34
1-Q <sub>10</sub>	1194

The 2×ATC method yields the most stringent limits for Tigerton WWTF.

The current permit has variable daily maximum effluent limits based on effluent pH. Presented below is a table of daily maximum ammonia nitrogen limitations corresponding to the range of allowable effluent pH values.

**Daily Maximum Ammonia Nitrogen Limits – WWSE**

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

Section NR 106.33(2), Wis. Adm. Code, was updated effective September 1, 2016. As a result, seasonal 20 and 40 mg/L thresholds for including ammonia limits in municipal discharge permits are no longer applicable under current rules. As such, the table has been expanded from the table in the current permit to include ammonia nitrogen limits throughout the allowable pH range.

**Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)**

Weekly and monthly average limits based on chronic toxicity criteria for ammonia are also calculated to determine the weekly and monthly average limits to meet the requirements of s. NR 106.07(3), Wis. Adm. Code.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

Attachment #1

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as a Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{ [0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})] \} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 0.854,

C = the minimum of 2.85 or  $1.45 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Present), or

C =  $1.45 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Absent), and

T = the temperature (°C) of the receiving water – (Early Life Stages Present), or

T = the maximum of the actual temperature (°C) and 7 – (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q<sub>10</sub> (4-Q<sub>3</sub>, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q<sub>5</sub> (estimated as 85% of the 7-Q<sub>2</sub> if the 30-Q<sub>5</sub> is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in the South Branch Embarrass River, based on conversations with local fisheries biologists. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a warmwater sport fish classification.

Since minimal ambient data is available, the “default” basin assumed values are used for Temperature, pH and background ammonia concentrations, shown in the table below, with the resulting criteria and effluent limitations.

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
<b>Effluent Flow</b>	Q <sub>e</sub> (MGD)	0.112	0.112	0.112
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	15	15	15
	7-Q <sub>2</sub> (cfs)	24	24	24
	Ammonia (mg/L)	0.04	0.03	0.07
	Average Temperature (°C)	12	19	4
	Maximum Temperature (°C)	14	21	10
	pH (s.u.)	8.06	8.08	7.99
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	7.5	15	3.75
	Reference Monthly Flow (cfs)	10.2	20.4	5.1
<b>Criteria mg/L</b>	4-day Chronic			
	Early Life Stages Present	5.55	3.66	
	Early Life Stages Absent			8.23

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		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
	30-day Chronic			
	Early Life Stages Present	2.22	1.46	
	Early Life Stages Absent			3.29
<b>Effluent Limitations mg/L</b>	Weekly Average			
	Early Life Stages Present	244	317	
	Early Life Stages Absent			185
	Monthly Average			
	Early Life Stages Present	131	171	
	Early Life Stages Absent			98.1

### Effluent Data

The following table evaluates the statistics based upon ammonia data reported from 07/01/2015 to 02/29/2020, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Tigerton permit for the respective month ranges. That need is determined by calculating 99<sup>th</sup> upper percentile (or P<sub>99</sub>) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit. Based on this comparison, the daily maximum limit is required year-round.

Ammonia Nitrogen mg/L	April - May	June - September	October - March
1-day P <sub>99</sub>	38.8	39.3	50.5
4-day P <sub>99</sub>	23.8	21.7	27.6
30-day P <sub>99</sub>	16.2	12.4	15.5
Mean	12.7	8.50	10.3
Std	7.43	7.96	10.3
Sample size	69	163	252
Range	0.26 – 34.2	0.11 – 34.9	0.063 – 42.5

Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

- (b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

### Conclusions and Recommendations:

In summary, after rounding to two significant figures, a daily maximum ammonia nitrogen limit is required. The current permit has a variable pH limit; the updated variable limit table can be continued in place of the single limit of 34 mg/L. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Additional limits to meet the requirements in s. NR 106.07, Wis. Adm Code, are addressed in the expression of limits section of this memo.

## PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Code became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

*E. coli* monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Tigerton's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required during May through September. No changes are recommended to the current recreational period and the required disinfection season.

### Interim Limit

At this time, there is no effluent *E. coli* data available to determine if these limits are currently met. The permit will include a compliance schedule to meet these limits. During the compliance schedule, an interim limit applies to prevent back-sliding from the current level of disinfection during the compliance schedule period. Therefore, the current **fecal coliform limit shall be included in the reissued permit as an interim limit of 400 counts/100 mL as a monthly geometric mean.**

## PART 5 – PHOSPHORUS

### Technology Based Phosphorus Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because Tigerton does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than/greater than 150 lbs/month, which is the threshold for municipalities in accordance to s. NR 217.04 (1) (a) 1, Wis. Adm. Code, and therefore no technology-based limit is required.

Month	Monthly Avg. mg/L	Total Flow MG/month*	Total Phosphorus lb./mo.**
June 2018	6.8	2.04	116
August 2018	2.4	1.71	34.2
September 2018	1.6	2.09	27.8
October 2018	3.2	2.35	62.7

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Month	Monthly Avg. mg/L	Total Flow MG/month*	Total Phosphorus lb./mo.**
November 2018	3.9	2.65	86.3
December 2018	1.6	1.69	22.5
February 2019	4.5	1.15	43.0
March 2019	0.41	4.03	13.8
April 2019	1.4	5.63	65.7
May 2019	0.92	6.41	49.2
June 2019	3.2	3.51	93.6
Average			55.9

\*The influent flow rate measurement was used in this calculation, because effluent flow measurements are not available

\*\*Total P (lbs/month) = Monthly average (mg/L) × annual average design flow (MGD) × 8.34 (lbs/gallon) × 30 (day/month)

In addition, TMDL-derived WQBEL limits are needed for the Upper Fox and Wolf River Basin.

### Water Quality-Based Effluent Limits (WQBEL)

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.06), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102.

The Department has developed a TMDL for the Upper Fox and Wolf River Basins (UFWB) which was approved by the US EPA in February 2020.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL based limitation for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. The UFWB TMDL establishes total phosphorus (TP) wasteload allocations (WLA) to reduce the loading in the entire watershed including WLAs to meet water quality standards for tributaries to the Upper Fox and Wolf River. Therefore, WLA-based WQBELs are protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are not required

### Upper Fox and Wolf River Basin TMDL

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020) and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA found in Appendix H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf River Basins (UFWB TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The annual WLA for Tigerton is 58 lbs/year.

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Upper Fox and Wolf River Basins TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

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$$\begin{aligned}\text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (365 \text{ days/year} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 58 \text{ lbs/year} \div (365 \text{ days/year} * 0.112 \text{ MGD} * 8.34) \\ &= 0.17 \text{ mg/L}\end{aligned}$$

Since this value is less than 0.3 mg/L, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is set equal at three times the six-month average limit.

$$\begin{aligned}\text{TP Six-Month Average Permit Limit} &= \text{WLA} \div 365 \text{ days/year} * \text{multiplier} \\ &= (58 \text{ lbs/year} \div 365 \text{ days/year}) * 1.30 \\ &= 0.207 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{TP Monthly Average Permit Limit} &= \text{TP Six-Month Average Permit Limit} * 3 \\ &= 0.27 \text{ lbs/day} * 3 \\ &= 0.620 \text{ lbs/day}\end{aligned}$$

The multiplier used in the six-month average calculation was determined according to implementation guidance. A coefficient of variation (CV) was calculated, based on phosphorus mass monitoring data, to be 0.6. This was calculated by dividing the standard deviation of the phosphorus mass data by the average of the phosphorus mass data. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as monthly. The reissued permit will have a phosphorus monitoring frequency of weekly, so this frequency was used for the calculation of the phosphorus limits. If a different monitoring frequency is used, the stated limits should be reevaluated.

Six-month average and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to concentrations of 0.221 mg/L and 0.663 mg/L at the facility design flow of 0.112 MGD.

Since WLAs are expressed as annual loads (lbs/year), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TP. Rolling 12-month sums can be compared directly to the annual WLA.

### **Effluent Data**

The following table summarizes the statistics based upon phosphorus data reported from 07/01/2015 to 02/29/2020.

	Total Phosphorus mg/L	Total Phosphorus lbs/day
1-day P <sub>99</sub>	9.5	5.4
4-day P <sub>99</sub>	5.7	3.3
30-day P <sub>99</sub>	3.7	2.3
Mean	2.9	1.8
Std	1.9	1.0
Sample size	12	12
Range	0.41 – 6.8	0.45 – 3.6

### Interim Limit

An interim limit is required per s. NR 217.17, Wis. Adm. Code, when a compliance schedule is needed in the permit to meet the WQBEL. The interim limit should reflect a concentration that the facility is able to meet without investing in additional “temporary” treatment, but also should prevent backsliding from current conditions. Therefore, **it is recommended that the interim limit be set equal to 5.7 mg/L for permit reissuance along with requirements for optimization of phosphorus removal.** This value reflects the 4-day P<sub>99</sub> concentration of 5.7 mg/L from the current permit term. This value is recommended instead of the 30-day P<sub>99</sub> concentration of 3.7 mg/L to allow for operational flexibility when the facility begins to initiate phosphorus treatment optimization activities, which often consist of trial and error.

## PART 6 – TOTAL SUSPENDED SOLIDS

Total Suspended Solids (TSS) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020). This WLAs found in Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf Basins (UFWB TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The annual WLA for Tigerton is 6,611 lbs/year and the daily WLA is 18 lbs/day.

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin’s water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Tigerton Wastewater Treatment Facility is a municipal treatment facility and is therefore subject to weekly average and monthly average TSS limits derived from TSS annual WLAs.

$$\begin{aligned}\text{TSS Weekly Average Permit Limit} &= \text{Daily WLA} * \text{Weekly multiplier} \\ &= 18 \text{ lbs/day} * 2.37 \\ &= 42.7 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{TSS Monthly Average Permit Limit} &= \text{Daily WLA} * \text{Monthly multiplier} \\ &= 18 \text{ lbs/day} * 1.59 \\ &= 28.6 \text{ lbs/day}\end{aligned}$$

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 1.1 (the standard deviation divided by the average). However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 2/week; if a different monitoring frequency is used, the stated limits should be reevaluated.

**Effluent Data**

The following table summarizes the statistics based upon TSS data reported from 07/01/2015 to 01/31/2020.

	TSS mg/L	TSS lbs/day
1-day P <sub>99</sub>	11	11
4-day P <sub>99</sub>	6.5	5.8
30-day P <sub>99</sub>	4.2	3.1
Mean	3.1	2.0
Std	2.2	2.2
Sample size	479	478
Range	0 – 22	0.28 – 32

Effluent data from Tigerton shows that the facility can currently meet the TMDL-derived TSS limits. Therefore, a compliance schedule is not recommended, and **the TMDL-derived limits should be effective upon permit reissuance. In addition, the current concentration limits are recommended to continue in the reissued permit to prevent backsliding.**

#### **PART 7 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL**

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

Due to the amount of upstream flow available for dilution in the limit calculation ( $Q_s:Q_e > 20:1$ ), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code). At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system. Therefore, there is no reasonable potential for the discharge to exceed this limit. **No monitoring or effluent limits are recommended for temperature.**

#### **PART 8 – WHOLE EFFLUENT TOXICITY (WET)**

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the WET Program Guidance Document (October 29, 2019).

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- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC<sub>50</sub> (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09 (2) (b), Wis. Adm Code.
- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC<sub>25</sub> (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09 (3) (b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 4% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$\text{IWC (as \%)} = Q_e \div \{(1 - f) Q_e + Q_s\} \times 100$$

Where:

$Q_e$  = annual average flow = 0.112 MGD = 0.173 cfs

$f$  = fraction of the  $Q_e$  withdrawn from the receiving water = 0

$Q_s$  = 1/4 of the 7- $Q_{10}$  = 15 cfs  $\div$  4 = 3.75 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08 (3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

**WET Data History**

Date Test Initiated	Acute Results LC <sub>50</sub> % (% survival in 100% effluent)			
	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?
12/19/1996	>100	>100	Pass	Yes
04/06/2016	>100	>100	Pass	Yes
08/22/2018	>100	>100	Pass	Yes

- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. **WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.**

Acute Reasonable Potential = [(TUa effluent) (B)(AMZ)]

Chronic Reasonable Potential = [(TUc effluent) (B)(IWC)]

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According to s. NR 106.08(6)(d), Wis. Adm. Code, TUa and TUc effluent values are equal to zero whenever toxicity is not detected (i.e. when the  $LC_{50}$ ,  $IC_{25}$  or  $IC_{50} \geq 100\%$ ).

Acute Reasonable Potential =  $0 < 1.0$ , reasonable potential is not shown, and a limit is not required.

Chronic Reasonable Potential =  $0 < 1.0$ , reasonable potential is not shown, and a limit is not required.

The WET Checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The Checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The Checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the Checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET Checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET Checklist, see Chapter 1.3 of the WET Guidance Document: <http://dnr.wi.gov/topic/wastewater/WETguidance.html>.

**WET Checklist Summary**

	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>	IWC = 4%. <b>0 Points</b>
<b>Historical Data</b>	3 tests used to calculate RP. No tests failed. <b>0 Points</b>	No data in past five years <b>5 Points</b>
<b>Effluent Variability</b>	Little variability, no violations or upsets, consistent WWTF operations. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Receiving Water Classification</b>	Warmwater sport fishery. <b>5 Points</b>	Same as Acute. <b>5 Points</b>
<b>Chemical-Specific Data</b>	Limits for ammonia nitrogen based on RP for ATC; chloride, copper, and zinc detected. Additional Compounds of Concern: none <b>8 Points</b>	Limits for no substances based on CTC; ammonia, chloride, copper, and zinc detected. Additional Compounds of Concern: none <b>3 Points</b>
<b>Additives</b>	0 Biocides and 0 Water Quality Conditioners added. P treatment chemical other than Ferric Chloride (FeCl <sub>3</sub> ), Ferrous Sulfate (FeSO <sub>4</sub> ), or alum used: No <b>0 Points</b>	All additives not used more than once per 4 days. <b>0 Points</b>
<b>Discharge Category</b>	0 Industrial Contributors. <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Wastewater Treatment</b>	Secondary or better <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>13 Points</b>	<b>13 Points</b>

	Acute	Chronic
<b>Recommended Monitoring Frequency (from Checklist):</b>	No tests recommended	No tests recommended
<b>Limit Required?</b>	No	No
<b>TRE Recommended? (from Checklist)</b>	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2019), no WET testing is recommended because the potential for effluent toxicity is believed to be very low.

## PART 9 – EXPRESSION OF LIMITS

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin's water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Tigerton is a municipal treatment facility and is therefore subject to weekly average and monthly average limitations whenever limitations are determined to be necessary.

This evaluation provides additional limitations necessary to comply with the expression of limits in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code. Pollutants already compliant with these rules or that have an approved impracticability demonstration, are excluded from this evaluation including water-quality based effluent limitations for phosphorus, temperature, and pH, among other parameters. Mass limitations are not subject to the limit expression requirements if concentrations limits are given.

### Method for calculation:

The methods for calculating limitations for continuous discharges subject to ch. NR 210 to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

1. Whenever a daily maximum limitation is determined necessary to protect water quality, a weekly and monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.
  - Ammonia Nitrogen – Variable daily limits were determined to be necessary so weekly and monthly average limits are also needed. The calculated weekly and monthly average limits are greater than 108 mg/L, which is the highest limit in the variable pH table, except for the monthly average limit for October – March. The weekly and monthly average limits should be set equal to 108 mg/L for all months except for the monthly average limit for October – March. For these months, the monthly average limit should be the calculated limit of 98 mg/L from Part 3 of this memo.
2. Whenever a weekly average limitation is determined necessary to protect water quality, a monthly average limitation shall also be included in the permit and set equal to the weekly average limit unless a more restrictive limit is already determined necessary to protect water quality.

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3. Whenever a monthly average limitation is determined necessary to protect water quality, a weekly average limit shall be calculated using the following procedure and included in the permit unless a more restrictive limit is already determined necessary to protect water quality:

$$\text{Weekly Average Limitation} = (\text{Monthly Average Limitation} \times \text{MF})$$

Where:

MF= Multiplication factor as defined in Table 1

CV= coefficient of variation (CV) as calculated in s. NR 106.07(5m)

n= the number of samples per month required in the permit

s. NR 106.07 (3) (e) 4. Table 1 — Multiplication Factor (for CV = 0.6)

CV	n=1	n=2	n=3	<b>n=4</b>	n=8	n=12	n=16	n=20	n=24	n=30
0.6	1.00	1.31	1.51	<b>1.64</b>	1.95	2.12	2.23	2.30	2.36	2.43

Note: This methodology is based on the *Technical Support Document for Water Quality-based Toxics Control* (March 1991). PB91-127415.

**Summary of Additional Limitations:**

In conclusion, the following additional limitations are required to comply with ss. NR 106.07 and NR 205.065(7) Expression of Limits.

Parameter	Daily Maximum	Weekly Average	Monthly Average
Ammonia Nitrogen			
April – May	Variable	<b>108 mg/L</b>	<b>108 mg/L</b>
June – Sept	Variable	<b>108 mg/L</b>	<b>108 mg/L</b>
Oct – March	Variable	<b>108 mg/L</b>	<b>98 mg/L</b>

